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Editorial

The Crisis in Science Teaching

"*IN PRODUCING* scientists we need to run very much faster if we intend to win the race for survival" warns Professor Joel Hildebrand, one of America's great chemistry teachers and president-elect of the American Chemical Society. Discussing the fact that "western civilization with its fair degree of humanity, decency and freedom is menaced by a ruthless barbarism from the East," he concludes that "although we will not be saved from disaster by science alone, we will not be saved without science; all of it that we can muster!"

These words are most timely in view of the impressive evidence that the totalitarian nations are now producing substantially greater numbers of scientists and engineers than the free world. It is important that the country understand the seriousness of the situation and the necessity of training far larger numbers in the physical sciences and engineering. For not only must more young people be encouraged to enter these fields, but those who have chosen them must, if they are capable, be permitted to complete their education and then to practice their newly learned scientific or engineering professions. To draft such people for military service and give them nontechnical assignments is both stupid and hazardous from the standpoint of national defense. Yet it has been and is being done.

The alarming decrease in the number of graduates in the sciences is a direct consequence of the critical state of science teaching in the secondary schools. With a high school population that will increase 50% in the next six years, there is a growing decrease in both the number and the quality of science teachers. Compared with 1950, there were this year 34% fewer bachelor degrees conferred, but the decrease in the number prepared to teach science at the secondary school level was 56%. At present, 7000 new science teachers are needed annually, but only 5000 are graduated in science and less than half of these are actually going into teaching.

An inevitable result of this shortage of teachers is a decline in quality, particularly in the smaller high schools, for, when a teacher of the desired qualifications cannot be found, someone with lesser qualifications is hired. While it is to be expected that teachers who have majored in one science often will have to teach all science classes, a survey has shown that a considerable proportion of science teachers have had no science courses at all. It is very common to find that those teaching all of the high school science courses in a given school have had only one elementary course in science, usually chemistry or biology. Perhaps the most common arrangement of all is to ask teachers prepared in and teaching other subjects to teach in addition one class in science. Many schools offer chemistry and physics in alternate years. There is a growing practice of having the athletic coach teach chemistry and, realizing this, some colleges are including elementary chemistry as a requirement in their physical education curricula. The boys ought at least to make the football team!

There are two reasons for the present deplorable state of science teaching in the high schools. The first and foremost is the low salary level of the teaching profession. As Dean George R. Harrison says of secondary school teachers, "It does not take an eagle eye to see that they are more to be pitied than censured. While the national income has tripled, expenditures for public education have remained practically static. While factory wages have gone up an average of 56%, teachers' salaries have gone up an average of 7%." During this period, the chemical industry has grown more than fourfold and the electronics industry has increased ten times in size. It is no wonder that industrial opportunities have attracted a large proportion of the best

(*Continued on next page*)

trained and most capable science teachers. Those dedicated individuals of first-rate ability who persist in teaching are finding it necessary to supplement their incomes by engaging in such outside activities as clerking in a store, driving a truck, and operating a shoe repair shop to cite only three instances recently observed.

Another and more insidious influence contributing to poor science teaching is the prevalent philosophy of the teacher's training schools that methodology is more important than knowledge of subject matter. Instead of receiving adequate instruction in science, students in these institutions learn, according to examples cited by Professor Hildebrand, "that education is the total procedure of reciprocating life responses by which personality, institutional progress and civilization are achieved. The business of education is to universalize the historico-scientific mindedness. . . . The spreading of this historico-scientific mindedness is the process of enriching the social soil," and finally that "society consists of persons plus psychosocial processes, plus the products of these processes, plus the patterns which result from them. And the whole system of relationships between these factors is what the sociologist calls culture."

The teacher-candidates who are fed this nonsense become science teachers and also public school administrators. As professional "educators," they have captured the state public school systems. The result is that all states require professional study in education for certification to teach but are less concerned about other subjects. For example, twenty-two states do not require any training in science for certification to teach science; others, however, do specify from 18 to 40 semester hours in the sciences.

It is coming to be recognized that the present declining trend in the selection of the sciences for careers will not be reversed until a marked improvement in both the number and quality of science teachers has been brought about. Only enthusiastic, inspired teachers who know their science and take pride in the profession of science teaching can influence young people in the choice of science as a career.

Solution of the problem of improving science teaching must lie in bringing about a marked increase in salaries and a change in emphasis in training, whereby knowledge of science as well as method of presentation will be required. Effort toward the attainment of these objectives must be undertaken primarily at the community level. Once the gravity of the situation is understood, thoughtful citizens will insist upon remedial action.

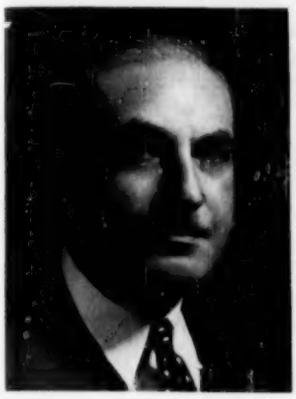
The scientific and engineering societies can play an important part through their regional groups and national organizations. For example, local sections of these societies should seek out the science teachers in the schools in their areas and encourage them to take part in technical and social meetings of their groups. Local sections of chemical societies should take the lead in persuading chemical companies to give summer employment to chemistry teachers, thereby enhancing both the income and professional experience of the teachers. Local sections should be willing to support science clubs and science fairs in the schools. They should create sentiment toward influencing local and state school authorities to reward and give special recognition to meritorious teachers. Activities of this sort will develop an atmosphere conducive to good teaching, as well as raise the prestige of the teacher.

The Virginia Academy of Sciences through its Junior Academy is doing a great deal to stimulate both student and teacher interest in science. Other state or regional scientific bodies might well sponsor similar junior affiliates and thereby promote wider participation and even competition in scientific programs.

Finally, the technical societies acting through their national organizations can be effective in influencing colleges, state educational authorities, and the public at large toward bringing about better science training for teachers. Professional societies and academies can do much to encourage science teachers by devising means to promote their professional standing.

—R. M. Burns

CHARLES G. HARFORD has recently been transferred from the Cambridge laboratories of Arthur D. Little, Inc., to



CHARLES G. HARFORD

San Francisco, where he is Technical Director of the ADL Western Laboratory Division which was opened in June of this year. This division will provide research facilities for ADL's western clients. While with the company in Cambridge, he worked on many varied projects, including coating compositions for coal, uses for gold and platinum, causes for staining in Vermont marble, corrosion problems, and research on the manufacture of fluorine. His work has resulted in more than 20 patents.

CLARENCE G. OZAR

CLARENCE G. OZAR has accepted an appointment with the Detrex Corp., Detroit, Mich., as Liaison Chemist in Metal Cleaning and Finishing. His responsibilities are to provide technical information and assistance between research laboratories and sales and service technicians throughout the country. Formerly, Mr. Ozar was Service, Development, and Research Chemist in Metal Cleaning with the Cowles Chemical Co., Cleveland, Ohio.

PAUL H. CARDWELL, previously Laboratory Director at Dowell, Inc., a subsidiary of the Dow Chemical Co., Tulsa, Okla., is now engaged in basic and nuclear research with the Dow Chemical Co., Midland, Mich.

ERWIN F. LOWRY, Manager of the Lighting Engineering Laboratories of the Lighting Division of Sylvania Electric Products Inc., Salem, Mass., recently received the 1954 Illuminating Engineering Society Gold Medal, highest honor in the lighting field. The medal has been awarded annually since 1944, except in 1951 and 1953, for meritorious achievement conspicuously furthering the profession, art, or knowledge of illuminating engineering. Dr. Lowry is the first physicist engaged in light source research chosen to receive the society's medal. Nearly 30 patents have resulted from Dr. Lowry's research, almost all of which are related to gaseous discharge devices, especially cathodes. Most of his contributions to the art and science of lighting are found in the development of the fluorescent lamp.

WILLIAM N. DUNLAP was recently appointed Chief Chemist and Laboratory Director of the Reynolds-Robson Supply Co., Philadelphia, Pa. He was previously employed as Project Engineer with the Friez Instrument Division of the Bendix Aviation Corp. in Baltimore, Md.

W. W. SELLERS

W. W. SELLERS has been appointed head of the Electrochemical Section of the Bayonne, N. J., Research Laboratory of The International Nickel Co., Inc. Mr. Sellers joined the staff at the Bayonne Laboratory in 1944 as Research Chemist. His work has been chiefly in the electrodeposition of nickel and nickel alloys, in which field he has published several technical papers.

BOOK REVIEWS

PROCEDURES IN EXPERIMENTAL METALLURGY by A. U. Seybolt and J. E. Burke. Published by John Wiley & Sons, Inc., New York, 1953. xii plus 340 pages, $7.00.

A perennial problem to the book reviewer is the avoidance of clichés. This is one of those volumes which leaves little alternative. In brief, this book will find a ready audience, will meet with an enthusiastic reception, fulfill a long-felt need, is authoritatively written, will be a constant reference, should be in everyone's library, will serve the needs of student and research worker alike.

Most of these statements are, moreover, really applicable, however useless to the prospective purchaser. For the latter's sake, we should be more specific. "Procedures in Experimental Metallurgy" is just that, a reference-text-handbook on the experimental art, doing for the metallurgist what the classical Strong volume has done for the physicist. It covers the practical requisites that the student or laboratory apprentice is more often expected to absorb by telepathy, osmosis, or simple exposure.

The content of the book is best described by its authors: "The preparation of metal samples up to the point of making observations on the metal." Accordingly, it begins with furnaces of all types and temperature measurement and control, and includes refractories; atmospheres; melting, casting, and heat treatment; fabrication; and powder metallurgy. It concludes with chapters on the preparation of pure metals and of single crystals. The authors have wisely elected to omit any consideration whatsoever of optical and diffraction metallography as being a separate field, so that even metallographic preparation is not included.

The authors' own experimental work attests to their competence to write the book, and the writing itself attests intimate acquaintance with the laboratory bench. Throughout, a given procedure is described in successive terms of principle and purpose, reduction to practice, and the more prominent pit-

falls. The information they impart is of eminently practical nature. The section on leak hunting in vacuum systems, for example, will strike many sympathetic chords.

A reviewer's criticism often resolves into what he would have done differently had he been the author. This one, out of painful experience, would have given more than negligible attention to parasitic emf's in potentiometer circuits, and would want more detailed description of the principle and operation of commercial recorders and controllers—a section on "what to do until the service man arrives." This is how encyclopedias get compiled. He also, with a genuflection toward the organization which pays his salary, might wish the book had been delayed long enough to permit more than casual description of zone-melting and zone-levelling procedures.

A closing note of wistful regret: Our current texts are being competently illustrated, but with a slick, conventionalized technique suggesting a publisher's anonymous assembly line. The information is conveyed, perhaps more clearly than ever before, but that is all. One can suppose it should be enough. But nothing else of the kind carries either the conviction or the charm which Roger Hayward's drawings have granted the Strong "Procedures." Such are what Seybolt and Burke deserve.

R. G. Treuting

Rare Metals Handbook. Edited by Clifford A. Hampel. Published by Reinhold Publishing Corp., New York, 1954. 657 pages, $12.00.

This book, written by thirty-four specialists, is one that metallurgists, chemists, and engineers will find useful. It contains a wealth of up-to-date information, well systematized and readily located, about more than thirty-five metallic elements. Some of these—titanium, uranium, hafnium, and germanium—are but now acquiring prominence on the industrial stage. Others, such as manganese, tungsten, and vanadium, are old in use but have recently attained new stature. A book dealing with the "rare metals" has been badly needed for years; and now within twelve months two books, this and "Modern Uses of Nonferrous Metals," have appeared. The books, while covering some of the same elements, are more complementary than competitive.

The term "rare" in the title is not a happy choice, as the editor appreciates, and was used for want of a better adjective. It is intended to carry the metallurgist's connotation, "relatively scarce," i.e., excluding the thirteen "common" metals.

For the most part, each chapter discusses one element and the information about the various elements is arranged similarly in each, thus making it easy to use the book as a reference work. In the typical chapter a paragraph is devoted to each of the following: occurrence, production statistics, economics, derivation, physical and chemical properties, fabrication techniques, alloys, and present and potential uses. Variations in the care of preparing each chapter are to be expected and have been found. For example, in the chapter on beryllium a paragraph is repeated substanially verbatim, and "high electrical-high conductivity" is ascribed to beryllium copper alloys.

The bibliographical references at the end of each chapter are much more extensive than are usually found in such a work and add greatly to the value of the book. There are, for example, 389 references on uranium alone. The last chapter, giving tables of comparative data, is not only useful, but most interesting to peruse and constitutes a valuable feature.

The typography is good and the book seems sturdily bound in keeping with the usage that it might be expected to receive.

This reviewer likes the book and believes that it will be well received by those for whom it is intended.

E. E. Schumacher

Electrical Breakdown of Gases by J. M. Meek and J. D. Craggs. Published by the Oxford University Press, Amen House, London E.C. 4, 1953. 507 pages, $10.50.

The study of electrical discharges is one of the oldest in science. It has attracted many able researchers and one statesman-scientist who took considerable personal risk in determining the extent of the electrification of rain clouds with such simple apparatus as a key and a kite. "Electrical Breakdown in Gases" has been written by two of these able researchers. The preface states that the writers hope that the book will serve as a research tool for those "engaged in fundamental studies of the growth of electrical discharges in gases, but . . . (to) be of use to those concerned with the development and application of gas-filled electronic tubes, with gaseous dielectrics, etc."

The work begins with a chapter on the fundamental processes in discharges, the emphasis being on the mechanisms most often encountered in the various classes of electrical breakdown. This chapter includes discussions concerning the collision cross sections of simple atoms and molecules for elastic and inelastic collisions, as well as subjects such as electronic and ionic mobilities. Experiments dealing with photo ionization, electron attachment, and detachment are also covered. The remaining eleven chapters proceed quite logically to cover the phenomena which one would be likely to observe in time sequence as the current across a gap filled with a gas slowly increases.

The predominant interest of the book is in the transient processes of the discharge. These transient processes are the Townsend discharge or spark and the transition region between the spark and glow, and between the glow and the arc. A detailed estimate of the theories of the sparking mechanism is set forth in Chapter VI. The streamer mechanism of the spark which has produced some quite considerable discussion is delved into, as well as its criticism. Although the discussion will undoubtedly continue, it is desirable that the arguments both pro and con be collected and expounded in one place.

The subjects of lightning and corona, time lags, and the growing technical importance of heavy molecules as insulating gases are brought together for the first time. As a work which is a compilation of present knowledge of a complicated subject, "Electrical Discharge in Gases" suffers from a need, difficult to fulfill, to tie together its diffuse elements. A chemist or physicist will perhaps desire more elucidation from the standpoint of the atomic and electronic structures involved in the discharge, as well as a more generally critical approach to the many papers mentioned.

1955 BOUND VOLUMES

Members and subscribers who wish to receive bound copies of Vol. 102 (for 1955) can receive the volume for the low, prepublication price of $6.00 if their orders are received at Society Headquarters, 216 West 102 Street, New York 25, N. Y., by *December 1*. After that date members will be charged $12.00 and nonmembers, including subscribers, $18.00.

The book will probably be of greater use to those interested in the applied aspects of the discharge than to those delving into the fundamental problem.

KENNETH B. MCAFEE, JR.

RECENT PATENTS

Selected by Fred. W. Dodson, Chairman of the Patent Committee, from the Official Gazette.

August 3, 1954

Cusano, D. A., and Studer, F. J., 2,685,530, Method of Preparing Transparent Luminescent Screens

Rodda, S., 2,685,531, Light-Sensitive Electron-Emissive Electrode

Gauthier, G. G., 2,685,563, Anodic Oxidation of Aluminum

Emmett, R. A., Jr., and Petering, W. H., 2,685,564, Electrolytic Cleaning Process

Jones, L. V., Willis, S. J., and Perry, M. M., 2,685,565, Filtering and Cleaning Means

Schmitt, H., 2,685,566, Molten Metal Electrolysis Cells

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Justi, E., 2,685,608, Thermoelement, Particularly for the Electrothermic Production of Cold

Vuignier, M. A., 2,685,678, Quick Release Battery Terminal Clamp

August 10, 1954

Cory, G. L., 2,686,142, Method of Manufacturing Corrugated Microporous Separators of Hard Rubber Composition Material

Hoenes, H. S., 2,686,153, Apparatus for

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MANUSCRIPTS AND ABSTRACTS FOR SPRING MEETING

Manuscripts are now being received for the Spring Meeting of the Society, to be held at the Sheraton-Gibson Hotel in Cincinnati, May 1, 2, 3, 4, and 5, 1955. Subjects to be covered at the technical sessions probably will be Electric Insulation, Electronics, Electrothermics and Metallurgy, Industrial Electrolytics, and Theoretical Electrochemistry.

To be considered for this meeting, triplicate copies of manuscripts or abstracts (not to exceed 75 words in length) must be received at Society headquarters, 216 West 102nd Street, New York 25, N. Y., *not later than January 15, 1955.*

Generating Hydrogen and Oxygen
Jones, S., 2,686,157, Fluorescent Coating Composition and Process

Jones, S., 2,686,158, Fluorescent Coating Composition and Process Employing Boric Acid

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Cargill, A. B., 2,686,211, Combustion Furnace
Horn, F. H., and Neubauer, R. L., 2,686,212, Electric Heating Apparatus
Smyth, J. R., 2,686,213, Battery Plate and Method of Making Same
Arbogast, R. D., 2,686,214, Primary Battery
Rooksby, H. P., 2,686,274, Thermionic Cathode

August 17, 1954

Sadowsky, M., 2,686,734, Method of Coating Water Sensitive Phosphor Screens
Thomas, C. H., 2,686,735, Cathode Material
Stareck, J. E., and Dow, R., 2,686,756, Chromium Plating
Cook, W. J., Barker, W. V., and Tuck, J. H., 2,686,757, Suppression of Honeycombing in Cathode Nickel
Arbeit, P., and Thebault, L., 2,686,820, Glass Furnace and Process for Melting Glass
McMullen, J. C., 2,686,821, Apparatus for Melting and Fiberizing Refractory Materials
Evans, R. E., Darby, P. F., and Catlin, J. P., 2,686,822, Consumable Electrode Furnace and Method for Producing Titanium
Jones, M. F., 2,686,823, Rotary Electric Field Fluid Stirring Apparatus
Evans, R. E., Darby, P. F., and Owen, T. G., 2,686,824, Electric Furnace

Southern, R. L., 2,686,825, Furnace Structure
Paine, H. A., 2,686,826, Furnace Structure
Kohn, E. J., and Venezky, D. L., 2,686,858, Electrochemical Paper and Method of Preparing Same
Gray, A. N., and Murray, G. E., 2,686,859, Electroplating
Loosjes, R., 2,686,886, Electric Discharge Tube

August 24, 1954

Michaels, E. L., 2,687,360, Process for Making A Multicolor Fluorescent Screen
Hering, W., 2,687,373, Process for the Production of a Metal Offset Printing Plate
Merrill, E. W., 2,687,445, Battery Separator
Merrill, E. W., 2,687,446, Battery Separator
Merrill, E. W., 2,687,447, Battery Separator
Gulick, H. M., and Stedman, C. E., 2,687,448, Battery Cap Apparatus
Gulick, H. M., and Stedman, C. E., 2,687,449, Battery Cap Apparatus
Heine, T. H., and Evans, G. S., 2,687,486, Gaseous Discharge Lamp

August 31, 1954

Schaefer, R. A., Cerness, J. F., and Morrison, W. H., 2,687,565, Method of Bonding Aluminum to Steel
Cox, G. C., 2,687,993, Method of Electrocoating
Russell, J. J., and Headland, H. N., 2,687,994, Method of Forming an Oxide Coating on Tin
Lofthouse, E., 2,687,995, Electrolytic Production of Uranium Tetrafluoride
Butler, E. M., 2,687,996, Electrolytic Water Correction Device
Norton, C. L., Jr., and Steever, A. B., 2,688,046, Method of and Apparatus for Melting Refractory Material
Friedman, H., 2,688,097, Nitric Oxide Counter

LITERATURE FROM INDUSTRY

"Norton Refractories for the Ceramic Industry." New 28-page booklet describes Norton Refractories, their properties and their advantages to specific applications. In addition, it contains engineering tables and other data used in connection with the employment of refractories in the ceramic industry. This information should be helpful to plant managers, superintendents, design engineers, and kiln foremen. Norton Co. P-247

Fisher's New Catalogue. The most complete listing of laboratory chemicals anywhere is found in the new Fisher Chemical Index, the all-inclusive chemicals Blue Book. Fact-filled, cross-referenced, the catalogue lists all needed information on 7244 chemicals and reagents available at Fisher. Copies on request. Fisher Scientific Co. P-248

Electroplating Processes. 4-page, 2-color bulletin describes and lists key characteristics of 16 electroplating processes. These include 7 nickel plating, 3 zinc, 1 cadmium, 1 copper with and without periodic reverse current, 2 silver, 1 lead, and 1 bright ternary alloy plating process. Also included is a list of 10 services available to H-VW-M customers. Hanson-Van Winkle-Munning Co. P-249

Molybdenum Products. Recently published bulletin is a guide to the

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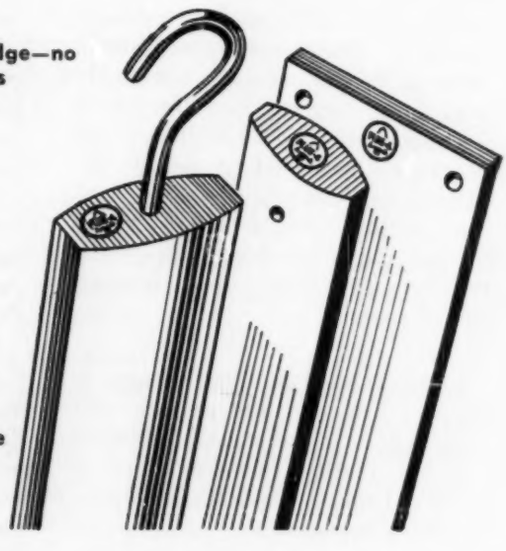

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ANACONDA® "PLUS-4" ANODES made by THE AMERICAN BRASS COMPANY

selection of molybdenum products for applications in the chemical process industries. It describes briefly the commercially available products, their manufacture, and their principal uses. It also lists the molybdenum chemicals available as analytical reagents and laboratory chemicals. In addition, the bulletin mentions sources of further information on the chemical properties and applications of molybdenum. Climax Molybdenum Co. P-250

"INSTRUMENTATION." Among the industrial developments reported in the current issue of "Instrumentation" are production techniques in the processing of the polio-fighting serum gamma globulin and the design of a weighing device so sensitive it can measure and record the difference in weight between a broad and a narrow pencil line. Also included are articles on boiler tube measurement, a report on the use of a new servo-analyzer, electronic burnout protection for a 60-ft rotary press and controls to regulate start-up procedures in an open hearth furnace. Minneapolis-Honeywell Regulator Co. P-251

BURRELL TUBE FURNACES. Bulletin gives complete data, including description of models and sizes, catalogue numbers, dimensions, specifications, ordering data and prices, of the Burrell high temperature electric tube furnaces for laboratories. Separate charts list heating elements required. Burrell "H" Models, new this year, are a new concept in tube furnace design. Faster heating, cooler operation, and greater flexibility are pointed up as features. Burrell Corp. P-252

MECHANICAL FINISHING. 4-page, 2-color bulletin describes products and equipment used for mechanical metal finishing. It lists H-VW-M's line of standard buffs, compositions, sisal buffs, brushes, polishing wheels, polishing and buffing lathes, and miscellaneous equipment and accessories. Literature references are included for all products and equipment. The bulletin thus serves as a handy index on the entire line of H-VW-M mechanical metal finishing products. Hanson-Van Winkle-Munning Co. P-253

To receive further information on any New Product or Literature from Industry listed above, send inquiry, with key number, to JOURNAL of The Electrochemical Society, 216 West 102nd Street, New York 25, N. Y.

Please print your name and address plainly.

NEW PRODUCTS

HEAVY DUTY ELECTROCLEANER. A new, heavy duty electrocleaner known as Pennsalt Cleaner K-8 has been introduced. Recommended for use on steel and copper, K-8 provides excellent detergency properties with unusual ability to remove mill oil and smut from steel prior to electroplating. The cleaner is a granular, anhydrous product containing 100% active ingredients which resist neutralization by acid soils, and provides excellent electrical conductivity. It is resistant to the effects of hard water and is free rinsing. Pennsylvania Salt Manufacturing Co. N-121

STATIONARY BATTERIES. Stationary batteries specifically designed for use in switchgear, control, and auxiliary power applications have been announced. They are made in two complete lines, PlastiCell and PlastiCal. Both lines have extra-thick positive plates with triple insulation suspended from ledges molded into the jar, thus allowing normal plate growth without strain on the cover. In addition, both feature: Plastite Post Seals which eliminate acid creepage, Safetee Vents which greatly reduce explosion hazards, and high-low level lines for easy visual checking of the electrolyte level. C & D Batteries, Inc. N-122

3-SPEED STIRRER. New 3-Speed Stirrer offers laboratories the "Hollow Spindle" and continuous, light duty operation at 500, 750, or 1000 rpm. The 1/50-hp split-phase, induction motor by Bodine develops 4 inch-pounds of torque. Stirrer is driven by V-belt on 3-step pulleys. Motor and stirrer are mounted on a 2-piece frame adjustable to maintain V-belt tension. The custom stirrer clamp allows adjustment in three planes. Eberbach Corp. N-123

ALKALINE RUST REMOVER. Nonelectrolytic alkaline derusting compound known as Alka-Deox 114 is stated to be a free-flowing powder that is used in a concentration from 1 to 3 lb/gal of water. Due to its alkaline nature there is no attack upon the base steel, leaving it clean and bright, and, because of its high alkalinity, paints, organic coatings, and other surface contaminants are removed together with rust. Due to the lack of necessity to use electric current, the product is stated to be ideal for bulk derusting of steel and cast and malleable iron. Bulletin on request. Enthone, Inc. N-124

TELEDYNE PRESSURE TRANSMITTER. Recently developed Teledyne Bonded Strain Gage Pressure Transmitter provides a new high standard of accurate and dependable transmission of pressure information from a remote or hazardous location to a central control room which may be several thousand feet distant. Used in combination with suitable self-balancing potentiometer type recorders, controllers, and valve systems, the Teledyne will control pressure of chemical and similar processes with a high degree of accuracy and reliability. Taber Instrument Corp. N-125

IRIDITE FINISHES. Five protective coatings for zinc, silver, copper, and aluminum have been added to the Iridite line of corrosion resistant finishes for nonferrous metals. The new Iridites are: #4-73 and #4-75 (Cast-Zinc-Brite), #18-P (Silver-Kote), #17-P (Cupreous-Kote), and #14-2 (Al-Coat). Like all Iridite finishes for nonferrous metals, the five new products are applied by a simple chemical dip, without electrolysis and without the need for special equipment or specially trained personnel. Their development increases the number of Iridite finishes to a total of 25. Full information on request. Allied Research Products, Inc. N-126

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The Electrochemical Society

INSTRUCTIONS TO AUTHORS OF PAPERS

Address all correspondence to the Editor, JOURNAL OF THE ELECTROCHEMICAL SOCIETY, 216 W. 102nd St., New York 25, N. Y.

FORM

Manuscripts submitted for publication should be in triplicate to expedite review. They should be typewritten, double-spaced, with 2½–4 cm (1–1½ in.) margins.

Title should be brief, followed by the author's name and his business or university connection.

Abstract of about 100 words should state the scope of the paper and give a brief summary of results.

ILLUSTRATIONS

Drawings will be reduced to column width, 8 cm (3⅛ in.), and after reduction should have lettering at least 0.15 cm ($\frac{1}{16}$ in.) high. Original drawings in India ink on tracing cloth or white paper are preferred. Curves may be drawn on coordinate paper only if the paper is ruled in blue. All lettering must be of lettering-guide quality. See sample drawing on reverse page.

Photographs must be glossy prints and mounted flat.

Captions for all figures must be included on a separate sheet. Captions and figure numbers should not appear in the body of the figure.

General—Figures should be used only when necessary. Omit drawings or photographs of familiar equipment. Figures from other publications are to be used only when the publication is not readily available, and should always be accompanied with written permission for reprinting.

REFERENCES

Literature and patent references should be listed at the end of the paper on a separate sheet, in the order in which they are cited. They should be given in the style adopted by *Chemical Abstracts*. For example:

R. Freas, *Trans. Electrochem. Soc.*, **40**, 109 (1921).

H. T. S. Britton, "Hydrogen Ions," Vol. **1**, p. 309, D. Van Nostrand Co., New York (1943).

H. F. Weiss (To Wood Conversion Co.), U. S. Pat. 1,695,445, Dec. 18, 1928.

UNITS OF MEASUREMENT

Metric units should be used throughout but, where desirable, English units may be given in parentheses.

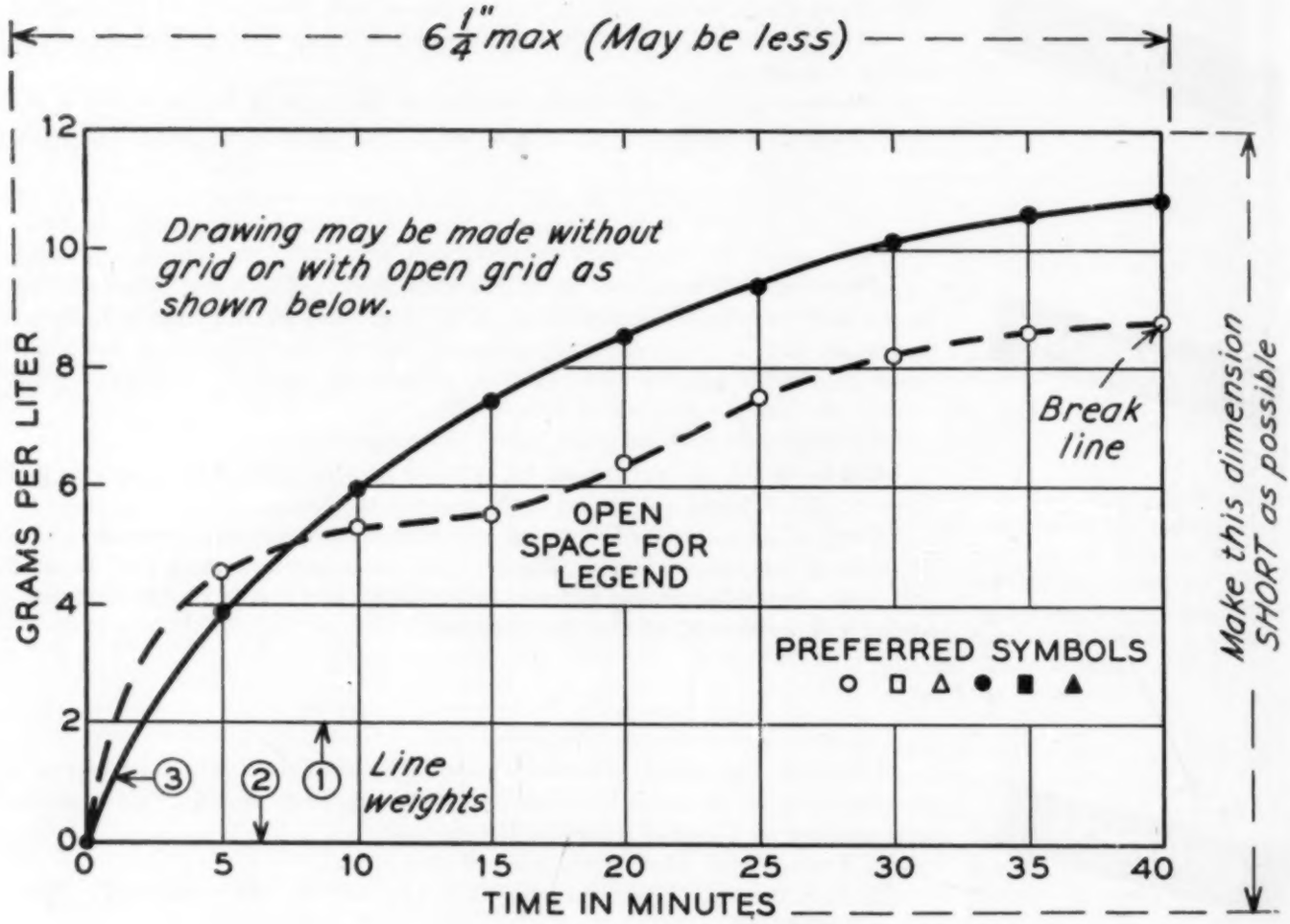
Corrosion rates in the metric system should preferably be expressed as milligrams per square decimeter per day (mdd), and in the English system as inches penetration per year (ipy).

As regards algebraic signs of potentials, the standard electrode potential for $Zn \rightarrow Zn^{++} + 2e$ is negative; for $Cu \rightarrow Cu^{++} + 2e$, positive.

Abbreviations should conform with the American Standards Association's list of "Abbreviations for Scientific and Engineering Terms."

Authors should be as brief as is consistent with clarity, and must omit all material which can be regarded as familiar to specialists in the particular field.

The use of proprietary names, trade-marks, and trade names should be avoided if possible. If used, these should be capitalized so that the owner's legal rights are not jeopardized.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Drawing may be made without grid or with open grid as shown below.
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TIME IN MINUTES
OPEN SPACE FOR LEGEND
Break line
PREFERRED SYMBOLS
Line weights
Make this dimension SHORT as possible

Remarks: Line weight ② is used for borders and zero lines. When several curves are shown, each may be numbered and described in the caption. Lettering is approx. 1/8".

SAMPLE CURVE DRAWING FOR REDUCTION TO $\frac{1}{2}$ SIZE